

PCN 15_0159

ADG5208/ADG5209 Data Sheet Changes

Rev. B to Rev. C

This document highlights the performance changes from the Rev. B to the Rev. C data sheet for the ADG5208 and ADG5209 Analog Multiplexers.

For full product information and changes to Typical Performance Characteristics plots please refer to the ADG5208/09 Rev. C data sheet.

1. HBM ESD

HBM ESD	Rev B	Rev C
I/O Port to Supplies	4kV	8kV
I/O Port to I/O Port	1kV	2kV
All other pins	4kV	8kV

2. Datasheet specification changes from Rev. B to Rev. C

Tables 1 to 4 outline a datasheet specification comparison of Rev. B to Rev. C material. The changed specifications are highlighted in red font.

SPECIFICATION CHANGES FROM Rev. B to Rev. C

Table 1. $V_{DD} = +15\text{ V} \pm 10\%$, $V_{SS} = -15\text{ V} \pm 10\%$, $GND = 0\text{ V}$, unless otherwise noted.

Parameter	Rev. B			Rev. C			Unit	Test Conditions/ Comments
	25°C	-40°C to +85°C	-40°C to +125°C	25°C	-40°C to +85°C	-40°C to +125°C		
ANALOG SWITCH								
Analog Signal Range	V_{DD} to V_{SS}			V_{DD} to V_{SS}			V	
On Resistance, R_{ON}	160			160			Ω typ	$V_S = \pm 10\text{ V}$, $I_S = -1\text{ mA}$
On-Resistance Match Between Channels, ΔR_{ON}	200	250	280	200	250	280	Ω max	$V_{DD} = +13.5\text{ V}$, $V_{SS} = -13.5\text{ V}$
On-Resistance Flatness, $R_{RELAT(ON)}$	3.5			3.5			Ω typ	$V_S = \pm 10\text{ V}$, $I_S = -1\text{ mA}$
	8	9	10	8	9	10	Ω max	
	40			40			Ω typ	
	50	65	70	50	65	70	Ω max	$V_S = \pm 10\text{ V}$, $I_S = -1\text{ mA}$
LEAKAGE CURRENTS								
Source Off Leakage, I_S (Off)	± 0.00 5			± 0.00 5			nA typ	$V_{DD} = +16.5\text{ V}$, $V_{SS} = -16.5\text{ V}$
	± 0.1	± 0.2	± 0.4	± 0.1	± 0.2	± 0.4	nA max	$V_S = \pm 10\text{ V}$, $V_D = \pm 10\text{ V}$
Drain Off Leakage, I_D (Off)	± 0.00 5			± 0.00 5			nA typ	$V_S = \pm 10\text{ V}$, $V_D = \pm 10\text{ V}$
	± 0.1	± 0.4	± 1.4	± 0.1	± 0.4	± 1.4	nA max	
Channel On Leakage, I_D (On), I_S (On)	± 0.01			± 0.01			nA typ	$\pm V_S = V_D = \pm 10\text{ V}$
	± 0.2	± 0.5	± 1.4	± 0.2	± 0.5	± 1.4	nA max	
DIGITAL INPUTS								
Input High Voltage, V_{INH}			2			2	V min	
Input Low Voltage, V_{INL}			0.8			0.8	V max	
Input Current, I_{INL} or I_{INH}	0.002			0.002			μA typ	$V_{IN} = V_{GND}$ or V_{DD}
			± 0.1			± 0.1	μA max	
Digital Input Capacitance, C_{IN}	3			3			pF typ	
Dynamic Characteristics¹								
Transition Time, $t_{TRANSITION}$	170			150			ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
	205	245	275	180	210	245	ns max	$V_S = 10\text{ V}$
t_{ON} (EN)	145			125			ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
	185	220	245	150	185	215	ns max	$V_S = 10\text{ V}$
t_{OFF} (EN)	120			160			ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
	145	165	180	185	210	230	ns max	$V_S = 10\text{ V}$
Break-Before-Make Time Delay, t_D	65			55			ns typ	$R_L = 300\ \Omega$, $C_L = 35\text{ pF}$
			30			25	ns min	$V_{S1} = V_{S2} = 10\text{ V}$
Charge Injection, Q_{INJ}	0.4			0.2			pC typ	$V_S = 0\text{ V}$, $R_S = 0\ \Omega$, $C_L = 1\text{ nF}$
Off Isolation	-90			-86			dB typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$
Channel-to-Channel Crosstalk	-90			-80			dB typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$
-3 dB Bandwidth								$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$
ADG5208	54			110			MHz typ	
ADG5209	133			240			MHz typ	
Insertion Loss	-6.4			-6.4			dB typ	$R_L = 50\ \Omega$, $C_L = 5\text{ pF}$, $f = 1\text{ MHz}$
C_S (Off)	5.5			2.9			pF typ	$V_S = 0\text{ V}$, $f = 1\text{ MHz}$
C_D (Off)								
ADG5208	52			34			pF typ	$V_S = 0\text{ V}$, $f = 1\text{ MHz}$
ADG5209	26			17			pF typ	$V_S = 0\text{ V}$, $f = 1\text{ MHz}$
C_D (On), C_S (On)								
ADG5208	58			37			pF typ	$V_S = 0\text{ V}$, $f = 1\text{ MHz}$
ADG5209	31			21			pF typ	$V_S = 0\text{ V}$, $f = 1\text{ MHz}$
POWER REQUIREMENTS								
I_{DD}	45			45			μA typ	$V_{DD} = +16.5\text{ V}$, $V_{SS} = -16.5\text{ V}$
	55		70	55		70	μA max	Digital inputs = 0 V or V_{DD}
I_{SS}	0.001			0.001			μA typ	Digital inputs = 0 V or V_{DD}
			1			1	μA max	
V_{DD}/V_{SS}			$\pm 9/\pm 22$			$\pm 9/\pm 22$	V min/V max	$GND = 0\text{ V}$

¹ Guaranteed by design, not subject to production test.

Table 2. $V_{DD} = +20V \pm 10\%$, $V_{SS} = -20V \pm 10\%$, $GND = 0V$, unless otherwise noted.

Parameter	Rev.B			Rev. C			Unit	Test Conditions/ Comments
	25°C	-40°C to +85°C	-40°C to +125°C	25°C	-40°C to +85°C	-40°C to +125°C		
ANALOG SWITCH								
Analog Signal Range	V_{DD} to V_{SS}			V_{DD} to V_{SS}			V	
On Resistance, R_{ON}	140			140			Ω typ	$V_S = \pm 15V$, $I_S = -1mA$
On-Resistance Match Between Channels, ΔR_{ON}	160	200	230	160	200	230	Ω max	$V_{DD} = +18V$, $V_{SS} = -18V$
On-Resistance Flatness, $R_{FLAT(ON)}$	3.5			3.5			Ω typ	$V_S = \pm 15V$, $I_S = -1mA$
	8	9	10	8	9	10	Ω max	
	34			34			Ω typ	$V_S = \pm 15V$, $I_S = -1mA$
	45	55	60	45	55	60	Ω max	
LEAKAGE CURRENTS								
Source Off Leakage, I_S (Off)	± 0.005			± 0.005			nA typ	$V_{DD} = +22V$, $V_{SS} = -22V$
	± 0.1	± 0.2	± 0.4	± 0.1	± 0.2	± 0.4	nA max	$V_S = \pm 15V$, $V_D = \pm 15V$
Drain Off Leakage, I_D (Off)	± 0.005			± 0.005			nA typ	$V_S = \pm 15V$, $V_D = \pm 15V$
	± 0.1	± 0.4	± 1.4	± 0.1	± 0.4	± 1.4	nA max	
Channel On Leakage, I_D (On), I_S (On)	± 0.01			± 0.01			nA typ	$\pm V_S = V_D = \pm 15V$
	± 0.2	± 0.5	± 1.4	± 0.2	± 0.5	± 1.4	nA max	
DIGITAL INPUTS								
Input High Voltage, V_{INH}			2			2	V min	
Input Low Voltage, V_{INL}			0.8			0.8	V max	
Input Current, I_{INL} or I_{INH}	0.002			0.002			μA typ	$V_{IN} = V_{GND}$ or V_{DD}
			± 0.1			± 0.1	μA max	
Digital Input Capacitance, C_{IN}	3			3			pF typ	
DYNAMIC CHARACTERISTICS¹								
Transition Time, $t_{TRANSITION}$	160			140			ns typ	$R_L = 300\Omega$, $C_L = 35pF$
	195	225	255	170	195	220	ns max	$V_S = 10V$
t_{ON} (EN)	145			120			ns typ	$R_L = 300\Omega$, $C_L = 35pF$
	170	200	225	140	170	195	ns max	$V_S = 10V$
t_{OFF} (EN)	120			160			ns typ	$R_L = 300\Omega$, $C_L = 35pF$
	140	155	170	185	205	220	ns max	$V_S = 10V$
Break-Before-Make Time Delay, t_D	55			45			ns typ	$R_L = 300\Omega$, $C_L = 35pF$
			30			20	ns min	$V_{S1} = V_{S2} = 10V$
Charge Injection, Q_{INJ}	0.3			0.4			pC typ	$V_S = 0V$, $R_S = 0\Omega$, $C_L = 1nF$
Off Isolation	-90			-86			dB typ	$R_L = 50\Omega$, $C_L = 5pF$, $f = 1MHz$
Channel-to-Channel Crosstalk	-90			-80			dB typ	$R_L = 50\Omega$, $C_L = 5pF$, $f = 1MHz$
-3 dB Bandwidth								$R_L = 50\Omega$, $C_L = 5pF$
ADG5208	60			121			MHz typ	
ADG5209	130			255			MHz typ	
Insertion Loss	-5.6			-5.6			dB typ	$R_L = 50\Omega$, $C_L = 5pF$, $f = 1MHz$; see
C_S (Off)	5.5			2.8			pF typ	$V_S = 0V$, $f = 1MHz$
C_D (Off)								
ADG5208	51			33			pF typ	$V_S = 0V$, $f = 1MHz$
ADG5209	26			17			pF typ	$V_S = 0V$, $f = 1MHz$
C_D (On), C_S (On)								
ADG5208	57			36			pF typ	$V_S = 0V$, $f = 1MHz$
ADG5209	31			21			pF typ	$V_S = 0V$, $f = 1MHz$
POWER REQUIREMENTS								
I_{DD}	50			50			μA typ	$V_{DD} = +22V$, $V_{SS} = -22V$
	70		110	70		110	μA max	Digital inputs = 0V or V_{DD}
I_{SS}	0.001			0.001			μA typ	Digital inputs = 0V or V_{DD}
			1			1	μA max	
V_{DD}/V_{SS}			$\pm 9/\pm 22$			$\pm 9/\pm 22$	V min/V max	$GND = 0V$

¹ Guaranteed by design, not subject to production test.

Table 3. $V_{DD} = +12V \pm 10\%$, $V_{SS} = 0V$ GND = 0 V, unless otherwise noted.

Parameter	Rev.B			Rev. C			Unit	Test Conditions/ Comments
	25°C	-40°C to +85°C	-40°C to +125°C	25°C	-40°C to +85°C	-40°C to +125°C		
ANALOG SWITCH								
Analog Signal Range	0 V to V_{DD}			0 V to V_{DD}			V	
On Resistance, R_{ON}	350			350			Ω typ	$V_S = 0V$ to 10V, $I_S = -1$ mA
On-Resistance Match Between Channels, ΔR_{ON}	500	610	700	500	610	700	Ω max	$V_{DD} = +10.8V$, $V_{SS} = 0$ V
On-Resistance Flatness, $R_{FLAT(ON)}$	5			5			Ω typ	$V_S = 0V$ to 10V, $I_S = -1$ mA
	20	22	24	20	22	24	Ω max	
	160			160			Ω typ	$V_S = 0V$ to 10V, $I_S = -1$ mA
	280	335	370	280	335	370	Ω max	
LEAKAGE CURRENTS								
Source Off Leakage, I_S (Off)	± 0.00 5			± 0.00 5			nA typ	$V_{DD} = 13.2V$, $V_{SS} = 0V$ $V_S = 1V/10V$, $V_D = +10$ V/1V
	± 0.1	± 0.2	± 0.4	± 0.1	± 0.2	± 0.4	nA max	
Drain Off Leakage, I_D (Off)	± 0.00 5			± 0.00 5			nA typ	$V_S = 1V/10V$, $V_D = +10$ V/1V
	± 0.1	± 0.4	± 1.4	± 0.1	± 0.4	± 1.4	nA max	
Channel On Leakage, I_D (On), I_S (On)	± 0.01			± 0.01			nA typ	$\pm V_S = V_D = 1V/10V$
	± 0.2	± 0.5	± 1.4	± 0.2	± 0.5	± 1.4	nA max	
DIGITAL INPUTS								
Input High Voltage, V_{INH}			2			2	V min	
Input Low Voltage, V_{INL}			0.8			0.8	V max	
Input Current, I_{INL} or I_{INH}	0.002			0.002			μA typ	$V_{IN} = V_{GND}$ or V_{DD}
			± 0.1			± 0.1	μA max	
Digital Input Capacitance, C_{IN}	3			3			pF typ	
DYNAMIC CHARACTERISTICS¹								
Transition Time, $t_{TRANSITION}$	210 270			200 250			ns typ ns max	$R_L = 300\Omega$, $C_L = 35$ pF $V_S = 8V$
t_{ON} (EN)	215 275	330	380	180 225	295	335	ns typ ns max	$R_L = 300\Omega$, $C_L = 35$ pF $V_S = 8V$
t_{OFF} (EN)	115 140	345	400	165 200	280	320	ns typ ns max	$R_L = 300\Omega$, $C_L = 35$ pF $V_S = 8V$
Break-Before-Make Time Delay, t_D	135	160	175	95	225	245	ns typ ns min	$R_L = 300\Omega$, $C_L = 35$ pF $V_{S1} = V_{S2} = 8V$
Charge Injection, Q_{INJ}	0.3			0.2			pC typ	$V_S = 6V$, $R_S = 0\Omega$, $C_L = 1$ nF
Off Isolation	-90			-86			dB typ	$R_L = 50\Omega$, $C_L = 5$ pF, $f = 1$ MHz
Channel-to-Channel Crosstalk	-90			-80			dB typ	$R_L = 50\Omega$, $C_L = 5$ pF, $f = 1$ MHz
-3 dB Bandwidth								$R_L = 50\Omega$, $C_L = 5$ pF
ADG5208	60			95			MHz typ	
ADG5209	120			180			MHz typ	
Insertion Loss	-8.8			-8.9			dB typ	$R_L = 50\Omega$, $C_L = 5$ pF, $f = 1$ MHz; see
C_S (Off)	6			3.3			pF typ	$V_S = 0V$, $f = 1$ MHz
C_D (Off)								
ADG5208	56			38			pF typ	$V_S = 0V$, $f = 1$ MHz
ADG5209	28			19			pF typ	$V_S = 0V$, $f = 1$ MHz
C_D (On), C_S (On)								
ADG5208	63			41			pF typ	$V_S = 0V$, $f = 1$ MHz
ADG5209	35			24			pF typ	$V_S = 0V$, $f = 1$ MHz
POWER REQUIREMENTS								
I_{DD}	40			40			μA typ	$V_{DD} = 13.2$ Digital inputs = 0 V or V_{DD}
	50		65	50		65	μA max	
V_{DD}			9/40			9/40	V min/V max	GND = 0 V, $V_{SS} = 0V$

¹ Guaranteed by design, not subject to production test.

Table 4. $V_{DD} = +36V \pm 10\%$, $V_{SS} = 0V$ $GND = 0V$, unless otherwise noted.

Parameter	Rev. B			Rev. C			Unit	Test Conditions/ Comments
	25°C	-40°C to +85°C	-40°C to +125°C	25°C	-40°C to +85°C	-40°C to +125°C		
ANALOG SWITCH								
Analog Signal Range	0 V to V_{DD}			0 V to V_{DD}			V	
On Resistance, R_{ON}	150			150			Ω typ	$V_S = \pm 10V$, $I_S = -1$ mA
	170	215	245	170	215	245	Ω max	$V_{DD} = +13.5V$, $V_{SS} = -13.5V$
On-Resistance Match Between Channels, ΔR_{ON}	3.5			3.5			Ω typ	$V_S = \pm 10V$, $I_S = -1$ mA
On-Resistance Flatness, $R_{FLAT(ON)}$	8	9	10	8	9	10	Ω max	
	35			35			Ω typ	
	55	65	70	55	65	70	Ω max	$V_S = \pm 10V$, $I_S = -1$ mA
LEAKAGE CURRENTS								
Source Off Leakage, I_S (Off)	± 0.00 5			± 0.00 5			nA typ	$V_{DD} = +16.5V$, $V_{SS} = -16.5V$
	± 0.1	± 0.2	± 0.4	± 0.1	± 0.2	± 0.4	nA max	$V_S = \pm 10V$, $V_D = \pm 10V$
Drain Off Leakage, I_D (Off)	± 0.00 5			± 0.00 5			nA typ	$V_S = \pm 10V$, $V_D = \pm 10V$
	± 0.1	± 0.4	± 1.4	± 0.1	± 0.4	± 1.4	nA max	
Channel On Leakage, I_D (On), I_S (On)	± 0.01			± 0.01			nA typ	$V_S = V_D = \pm 10V$;
	± 0.2	± 0.5	± 1.4	± 0.2	± 0.5	± 1.4	nA max	
DIGITAL INPUTS								
Input High Voltage, V_{INH}			2			2	V min	
Input Low Voltage, V_{INL}			0.8			0.8	V max	
Input Current, I_{INL} or I_{INH}	0.002			0.002			μA typ	$V_{IN} = V_{GND}$ or V_{DD}
			± 0.1			± 0.1	μA max	
Digital Input Capacitance, C_{IN}	3			3			pF typ	
DYNAMIC CHARACTERISTICS¹								
Transition Time, $t_{TRANSITION}$	185 230			170 205			ns typ ns max	$R_L = 300\Omega$, $C_L = 35$ pF $V_S = 10V$
t_{ON} (EN)	170 210	245	259	150 180	225	235	ns typ ns max	$R_L = 300\Omega$, $C_L = 35$ pF $V_S = 10V$
t_{OFF} (EN)	125 180	230	255	180 225	195	215	ns typ ns max	$R_L = 300\Omega$, $C_L = 35$ pF $V_S = 10V$
Break-Before-Make Time Delay, t_D	70	180	180	55	225	230	ns typ ns min	$R_L = 300\Omega$, $C_L = 35$ pF $V_{S1} = V_{S2} = 10V$
Charge Injection, Q_{INJ}	0.4			0.3			pC typ	$V_S = 0V$, $R_S = 0\Omega$, $C_L = 1$ nF
Off Isolation	-90			-86			dB typ	$R_L = 50\Omega$, $C_L = 5$ pF, $f = 1$ MHz
Channel-to-Channel Crosstalk	-90			-80			dB typ	$R_L = 50\Omega$, $C_L = 5$ pF, $f = 1$ MHz
-3 dB Bandwidth ADG5208	65			105			MHz typ	$R_L = 50\Omega$, $C_L = 5$ pF
ADG5209	130			195			MHz typ	
Insertion Loss	-6			-6.2			dB typ	$R_L = 50\Omega$, $C_L = 5$ pF, $f = 1$ MHz; see
C_S (Off)	5.5			2.7			pF typ	$V_S = 0V$, $f = 1$ MHz
C_D (Off)								
ADG5208	51			32			pF typ	$V_S = 0V$, $f = 1$ MHz
ADG5209	25			16			pF typ	$V_S = 0V$, $f = 1$ MHz
C_D (On), C_S (On)								
ADG5208	57			35			pF typ	$V_S = 0V$, $f = 1$ MHz
ADG5209	32			20			pF typ	$V_S = 0V$, $f = 1$ MHz
POWER REQUIREMENTS								
I_{DD}	80			80			μA typ	$V_{DD} = +16.5V$, $V_{SS} = -16.5V$
	100		130	100		130	μA max	Digital inputs = 0 V or V_{DD}
V_{DD}			9/40			9/40	V min/V max	$GND = 0V$, $V_{SS} = 0V$

¹ Guaranteed by design, not subject to production test.